Mountaintop EIS
Technical Report

by the

Mountaintop Technical Team

Team Members

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Executive Summary

During December 1999, the Office of Surface Mining (OSM), in cooperation with other federal and state agencies developed a work plan for comparing different mining and reclamation scenarios of mountaintop removal surface coal mining operations in West Virginia. The purpose of the comparisons was to evaluate the impact that limiting valley fills to ephemeral streams would have on coal resource recovery. The results of the comparisons will be included in the Environmental Impact Statement (EIS) required by a settlement agreement arising from the July 1998 *Bragg v. Robinson* litigation concerning mountaintop mining and associated valley fill construction in West Virginia.

An engineering team (Team) consisting of representatives from OSM, the West Virginia Division of Environmental Protection (WVDEP), Industry, and the Plaintiffs completed the evaluation. The Team first selected 14 proposed mine sites which were a representative sample of proposed mining sites in West Virginia and provided the permit applicants with a backfill template. The backfill template was designed to approximate the results that would be expected under the (then pending) Consent Decree AOC/Backfill Optimization Model. That model generally results in more spoil material being returned to the mined area and the tops of the valley fills being constructed higher than the lowest coal seam being mined. The Team requested the applicants to redesign their mine proposals so that the proposed valley fill toes were no closer than 100 feet from the beginning of an intermittent stream (i.e. completely within the ephemeral stream). When possible, the applicants in consultation with WVDEP established the ephemeral limit points. The Team received redesign proposals for 11 mines sites (10 surface mines and 1 refuse disposal impoundment).

The team critically reviewed each of the redesign proposals in order to assure the redesigns were objective and consistent with the stated purposes of the workplan, the backfill template, and the associated instructions. Once the Team was satisfied that these requirements were met, it requested the applicants to provide the estimated tonnage of coal reserves that could be extracted not only by the initially proposed mining method, but by alternative methods as well.

The Team did not request nor evaluate any of the economic information provided verbally by some of the applicants, nor was this information used in reaching the Team's conclusions.

Limiting valley fills to the ephemeral streams resulted in significant or total loss of the coal resource for 9 of the 11 mine sites when compared to the original mine site plans. All of the coal resource was lost for 6 of the 11 mine sites. By restricting fills to the ephemeral streams, the total coal recovery is estimated at 18.6 million tons, a 90.9 percent reduction. The original estimate was 186 million tons. The team noted that even if smaller fills could be constructed, they would impact nearly every available valley, possibly increasing the overall environmental impact.

Mountaintop Mining Technical Team Report

Background

A settlement agreement in West Virginia involving litigation over mountaintop mining and associated valley fills (*Bragg v. Robertson*) required an Environmental Impact Statement (EIS) to address the issues. As part of the EIS effort, the Office of Surface Mining (OSM) in cooperation with other federal and state agencies developed a work plan for comparing different mining and reclamation scenarios of mountaintop mining. The purpose of the comparisons was to evaluate the impact that the different scenarios would have on coal resource recovery. As a result of the subsequent decision by the federal judge in the case, the workplan was revised to evaluate what the impact of limiting valley fills to ephemeral streams would have on coal resource recovery.

Between January and May 2000, an engineering team (Team) consisting of representatives from OSM, the West Virginia Division of Environmental Protection (WVDEP), the West Virginia Coal Industry, and the Plaintiffs in the case completed the evaluation.

Methodology

The Team established a mine selection process, agreed upon the definition "ephemeral streams," and developed a procedure to gauge the impact of limiting fills to ephemeral streams on existing mine applications. The Team selected mines from pending applications in the five main mining regions. The geographic and geologic differences throughout West Virginia delineated the five main mining regions. In turn, each area was predisposed to different mining methods. The end result was a selection of mines representing various mining methods taking place in different geographic and geologic settings. The Team chose 14 pending surface mine applications submitted by coal companies who agreed to participate in the evaluation. Because of the possible impact of the ephemeral stream limit for refuse fill permits, the Team included one refuse fill in the evaluation.

Next, the Team developed a template for configuring the backfill and the valley fills for the 14 selected mine applications (see Attachment A). The backfill template required additional fill to be placed above the lowest coal seam, resulting in more backfill being returned to the mountain. Although not equivalent, the requirements of the backfill template exceeded the fill optimization requirements of the Consent Decree AOC Process template (also known by the working title of "AOC Plus") at the time of the study. It also approximated the results that may be expected under the Consent Decree AOC Process template.

The first step of the analysis was to obtain information from the pending applications concerning coal tonnage, overburden volumes, and numbers and sizes of valley fills. This provided the base information for each analysis. (This information is listed as Scenario 1 in the attached tables.) The second step was to ask the applicants to use the template to revise their original applications, limiting valley fills to the ephemeral stream, but using every available hollow as a disposal site. (Scenario 2 in the tables). In most cases, the revisions yielded a spoil imbalance. In some cases, applicants submitted information from original applications because ephemeral points were above the coal seam to be mined. The last step of the analysis was to estimate the coal tonnage which could be extracted from the site by alternative mining methods, using every available hollow as a disposal site, but limiting the fills to the ephemeral stream. The applicants were asked to consider all mining methods, including mountaintop removal, area mining, contour, highwall miner, augering, and underground mining.

Each applicant developed the plans for these evaluations independently. The Team reviewed the evaluations to assure that all possible fill sites were analyzed, the evaluations represented the maximum coal recovery, the evaluations met Attachment A backfill requirements, and the applicants had limited the fills to the ephemeral zone. The completed tables for each mine are attached.

The limits of the ephemeral stream (and therefore the beginning of the intermittent stream) were established using WVDEP procedures, "Guidance for Delineation of Ephemeral/Intermittent Streams," dated October 26, 1999 (included in Attachment D). The Team considered the state guidance document to be consistent with the Federal Surface Mining Control and Reclamation Act (SMCRA) definitions of ephemeral and intermittent streams. A separate team, led by the U.S. Geological Survey (USGS), field verified the ephemeral reach for five of the fourteen sampled sites during February and March 2000. Maps indicating the team's results are attached and identified as Attachment E. Only three of the five companies whose sites were field verified ultimately submitted data for this study.

Team Evaluation Process

During March and April 2000, the Team met with several of the participating companies to discuss their progress in completing the two scenarios. In addition, the Team reviewed the analyses and maps of those companies that had completed both scenarios. In every case, the Team believed the companies had indeed used every available fill site, established appropriate ephemeral limits, and met the backfill requirements of the template. Furthermore, for those sites where the USGS team had field verified the ephemeral points, the differences between the team's findings and the company's finding were insignificant. In all but one case, the USGS team's findings were generally consistent with the company's ephemeral limits in the field.

Results

The Team received data on ten surface mines and one refuse fill. The data as received is attached in tabular form (Attachment C). Summary discussions for each of the sites precede the tables (Attachment B). For the refuse fill, the reported coal production is from the underground mine that would generate the refuse. Table 1 of this report summarizes the data from the sites.

Conclusion

In nearly every valley reviewed, the lower end of the ephemeral stream was very high in the valley. This resulted in very small fills or no room for any fill. One site had been significantly impacted by underground mining, resulting in a much lower ephemeral point. Therefore, the coal recovery proposed in the original plan was not impacted. Still, even when using every available fill site, there was a major reduction in the total amount of excess spoil that could be placed in these fills. The reduction of available fill volume resulted in a significant reduction in coal resources recovered. The original plans for the 11 sites reviewed would have produced 186 million tons of coal. By restricting fills to the ephemeral streams, the total coal recovery is 16.8 million tons, a 90.9 percent reduction.

TABLE 1

MINE	FINAL EXCESS SPOIL		NUMBER OF FILLS		TONS OF COAL RECOVERED		ECONOMIC VIABILITY ##	% COAL LOST
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2		
"A"	31,400,000	3,100,000	2	0	24,700,000	4,800,000	No	81
"E"	31,900,000	3,600,000	4	2	4,000,000	350,000	No	92
"F" #	24,700,000	5,700,000	7	2	7,100,000	1,400,000	No	81
"G"	38,900,000	33,700,000	2	1	3,100,000	0	No	100
"L"	577,000	0	5	0	980,000	0	No	100
"P" #	10,600,000	0	3	0	2,600,000	0	No	100
"Q"	95,400,000	51,400,000	11	17	9,300,000	8,400,000	Questionable	10
"R" #	35,100,000	5,600,000	5	7	4,200,000	0	No	100
"S"	12,000,000	9,500,000	10	8	2,500,000	1,900,000	Yes	22
"U"	81,200,000	3,500,000	7	5	17,600,000	0*	No	100
"V" **	81,500,000	31,900,000	1	45	110,000,000	0	No	100
TOTAL	411,877,000	144,900,000	55	87	186,080,000	16,850,000		90.9%

* Due to toxic nature of top seam, entire resource lost as acid material cannot be put in valley fill.

\# Ephemeral Point Field Verified

** Refuse fill

\## As determined by the applicant

ATTACHMENTS

Attachment A

NOTES:
1) 2H:1V SLOPE BETWEEN TERRACES (BENCHES)
2) 50' VERTICAL (MAX.) BETWEEN TERRACES
3) TERRACES 20' WIDE
4) ASSUME ALL BACKFILLED SURFACES ARE LEVEL

MOUNTAINTOP MINING EIS
BACKFILLING/EXCESS SPOIL DISPOSAL TEMPLATE

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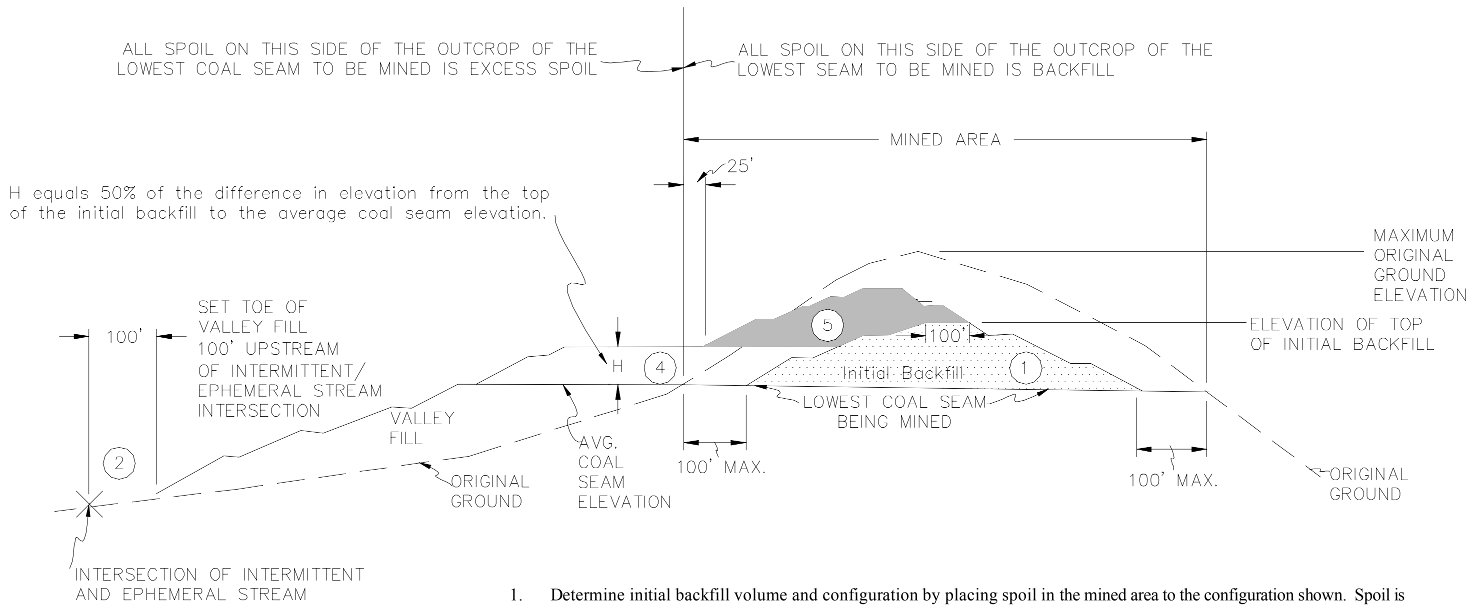
FOR ALL AREAS OF MINING EXCEPT FOR AREAS WHICH ARE STRICTLY CONTOUR MINING



-- NOT TO SCALE --

1. Determine initial backfill volume and configuration by placing spoil in the mined area to the configuration shown. Spoil is to be placed until the width of the top of the backfill is no greater than 100 feet or until the height of the backfill reaches the maximum elevation of original ground in the permit area.
2. Set the toe of all valley fills at a point 100 feet horizontally from the intermittent and ephemeral stream intersection.
3. Calculate the additional height (H) of valley fill required. H equals 50 % of the difference in elevation from the top of the initial backfill to the average coal seam elevation. H is added to the average coal seam elevation to determine the top of fill elevation.
4. Place spoil in the valley fill up to the (Average coal seam elevation + H) elevation.
5. Place additional spoil in the mined area adjacent to all valley fills. The toe of the spoil will be offset 25 feet from the outcrop line projected upward. Spoil will be placed upward until the width of the top of the backfill is no greater than 100 feet or until the height of the backfill reaches the maximum elevation of original ground in the permit area.

Please note: This template is for Mountaintop Mining EIS evaluation purposes only. This template does not represent the WV-DEP position on Approximate Original Contour.

Attachment B

Individual Mine Summaries

Mine A Summary

Mine A as originally planned was a combination mountaintop and contour mine with highwall mining planned. This original plan included two valley fills and would have recovered 24.7 million tons of clean coal. The requirement to limit fills to the ephemeral stream resulted in a contour mine with highwall mining and NO valley fills with the recovery of 4.8 million clean tons; an 80.6% reduction of recoverable reserves. Excess spoil storage was only available by hauling up-hill and stacking on an existing reclaimed valley fill.

Mine E Summary

Mine E is contour mining, and is not feasible due to slope of the original ground (Highwall Reclamation).

Coal seams are not conducive to auger or highwall mining due to low thickness and cost of washing produced coal.

Capital expenditures for the mine are not feasible due to minimal recoverable reserves.

Mine F Summary

Mine F is a contour/highwall mining operation with limited point removal areas. The site is adjacent to an inactive site that currently has some disturbed area associated with it. Scenario 1 represents a current SMCRA application that has been revised from the original submittal to provide less stream impacts by using the reasonable portions of the fill minimization guidelines of the new AOC policy. The main seams of removal are Stockton and Coalburg. Minor additional tonnage is taken from the No. 6 Block, No. 5 Block, and Clarion seams. Some areas above the mine permit have been previously surface mined in the upper seams and have small fills in the heads of the hollows.

Scenario 1 is designed for removal of 7.06 million recoverable surface and highwall mining tons at a cost comparable to the current coal market. Scenario 2 allows for the removal of 1.39 million tons at a significantly increased cost. This represents a reduction of 5.67 million tons, an 80 % reduction in reserves. Scenario 2 uses the available fill space in fills 4 and 5, plus hauls an additional 2.56 million cubic yards to the adjacent mined area in order to mine the estimated 1.39 million tons. It is important to note that this mine as revised in Scenario 2 is not feasible and would not be permitted or started in this market or foreseeable near term market. It would take estimated revenue of over $30 per ton to justify Scenario 2.

The ephemeral stream ending points for use in Scenario 2 were obtained from the OSM/EPA teams that recently visited the site. In five of the seven fills, the ephemeral portion of the stream was near or above the Middle Coalburg seam level, making the fills spatially and economically impossible. The ephemeral stream ended low enough in fill 4 to allow a small fill. Fill 5 was not affected since the stream was totally ephemeral due to stream loss from previous underground mining.

Mine G Summary

Scenario 1

Mine G as originally planned consists of mountaintop removal of one knob, and area mining (up to centerline of ridge) of a second knob. A total of eight distinct seam horizons were to be mined across the ridge. No contour, highwall mining, or augering was proposed. Permit area is steeply sloped with a maximum depth of cover of nearly 400 feet.

The original project proposed to recover 3.1 million tons of saleable coal and would generate roughly 64 mmcy of (loose) spoil. Just over 60% of this spoil was excess and proposed for disposal in two adjacent valley fills. The requirement to limit valley fills to ephemeral stream reaches resulted in the complete loss of one fill site, and a reduction in storage capacity at the second site of 55%. A third fill site was evaluated, but rejected due to its small volume, inaccessibility, and stability concerns. Even with super-elevation of the remaining valley, a 30% deficit in excess storage capacity resulted. Thus by mountaintop removal method, a 100% reduction in recoverable reserves would occur.

Scenario 2

Contour mining, outside the confines of a valley fill site, was not deemed practical due to difficulties associated with blasting in steep slopes (65%-80%) and the inability to conduct stable backfilling. Deep mining of any remaining seams was ruled out as none of the eight coal seams consistently averaged 36" or greater in thickness. Augering and highwall mining were rejected both due to the inability to create contour benches and due to the lack of sufficient seam thickness.

Contour and cross-ridge mining adjacent to valley fill site 2 was felt to be the only remaining option. It was estimated that through super-elevation of the fill site and backfilling per the prescribed criteria, a total of 25.5 mmcy of (loose) spoil storage could be made available. After correcting for bulking factor and strip ratio, this implies roughly 1.2 mm tons of saleable product could be extracted.

Scenario 2 would result in a loss of just over 60% of the reserve base.

The applicant submits, however, that mining and reclamation of the eight coal seams, which have an average depth of cover in excess of 300 feet, within a mineral removal area of about 75 acres, would not be possible without significant rehandling of materials. This lack of operation room and associate rehandling would result in production costs significantly above expected market realizations (currently at $23.50 to $24.00 per ton).

Mine L Summary

Mine L is a contour surface permit in the Coalburg seam. The contour cut is currently being permitted to approximately 13:1 strip ratio, with highwall mining to follow. Total tons estimated recoverable, as permitted, are approximately 978,000 tons with required initial excess spoil storage area of 1,807,988 cu. yds. None of the proposed valley fills occupy watersheds of 250 acres or greater. As the ephemeral/intermittent stream contact occurs at or above the Coalburg seam outcrop, it is not possible to build any hollow fills if only the ephemeral stream can be utilized. Such a restriction would result in a loss of 100% of estimated reserves for this permit.

Mine P Summary

Mine P is a combination contour and point-removal surface mine permit in the 5-block seam. Approximately 2,628,672 tons of strip and highwall mining reserves are estimated recoverable. The average ratio of cubic yards of O.B. to ton of coal is approximately 12:1, with an estimated initial excess spoil of 11,943,289 cubic yards. None of the designed valley fills were 250 acres or larger. Requiring valley fills to be confined to the ephemeral stream results in storage capacity of only 82,589 cubic yards. Only 31,500 tons would be recoverable under this scenario. However, due to economic considerations, this reserve would probably not be mined, so the effective loss of reserves is 100%.

Mine Q Summary

Mine Q proposes a combination of mountaintop/area mining, contour mining, and mining with a highwall miner. Four major coal horizons will be mined with a total of eight individual seams being mined. Several of the seams have been previously mined by contour and underground mining methods. The mine plan includes eleven (11) valley fills and would recover 9.3 million tons of coal. The in-site ratio is approximately 14:1.

Limiting mining and spoil placement to areas above the ephemeral stream limit and placement of spoil in all available hollows result in a spoil imbalance of 21.7 million cubic yards. (It should be noted that the mining area was slightly reduced in this scenario.) The spoil imbalance should be slightly greater if mining of all areas proposed in the permit application was evaluated.

The company re-evaluated the mining plan with the fills limited to the ephemeral limits. This scenario results in the recovery of 8.4 million tons of coal. Although this results in a reduction of only about 2 million tons of reserves, the company states that is doubtful that this scenario could fully be implemented.

Reasons stated for doubts about implementation:
(a) amount of pre-law contour mining on old rim cut benches;
(b) increased mining costs; and
(b) spoil placement requirements would possibly "spoil bound" operation.

Mine R Summary

Mine R was originally planned as a combination mountaintop, area, and contour mine with no augering proposed. All of the mineral removal area is classified as re-mining since the entire site has previously been extensively contour mined and augered. The plan included five (5) valley fills and would have recovered approximately 4.2 million tons of coal. The in-situ strip ratio is approaching 20:1.

As shown by the provided analysis, mining of this area if limited above the ephemeral point will not be economically feasible. By using the guidelines for this exercise, there is an imbalance of roughly 30 mm cubic yards of spoil. Attempting to re-balance the mining area is not feasible. Significant contour/augering in the 3, 4, and 5 seams (as well as excessive deep mining in the 3 seam) has already taken place. Surface mining above those areas would result in unacceptable strip ratios.

Deep mining of the 4 seam would be questionable due to the close proximity of the underlying 3 seam. Deep mining of the 5 seam could be considered, but only about 10% of the tonnage originally proposed to be mined by the mountaintop method might be recoverable. There is approximately 1,150,300 tons of in-place coal within the 5 seams. Assuming a 55% mining recovery and a 35% reject, it is estimated 411,200 saleable tons of 5 seam coal could be deep mined. This compares very unfavorably to the 41,186,000 tons proposed by the area mine.

The mineability of the 5 seam coal by underground methods, however, is presently impeded by several factors:

(a) the small reserve block size (<500,000 tons);
(b) lack of preparation facility (closest plant 30+ miles);
(c) presumed restrictions on constructing new coal refuse facility;
(d) unfavorable economy of scale due to lack of complimentary reserves.

In short, it is unlikely the deep mine block would "stand alone" as recoverable given today's economic and market conditions.

<u>Mine S Summary</u>

Mine S as originally planned was a combination mountaintop and contour mine with auger mining planned. This original plan included 10 valley fills and would have recovered approximately 2.5 million tons clean coal. The requirements to limit the fills to the ephemeral stream resulted in the following:

(a) eliminated 2 fills;
(b) reduced the recoverable reserves to approximately 2 million tons, or a 20% reduction in recoverable reserves; and
(c) eliminated the planned mountaintop and the highest seam and changed it to contour and highwall mining.

<u>Mine V Summary</u>

The company needs to store 110,000,000 tons of coarse and fine refuse from processing its reserves. These coal reserves are from two (2) large deep mines and a possible small contour strip mine. An impoundment was designed to store this amount of refuse in the same watershed that the prep plant and mine was located at. This was done in an effort to provide the most technically sound and environmentally friendly facility to disturb as few watersheds as possible. It required 1.6 miles of haulroad construction at a cost of $1,300,000.00. The site preparation cost was about $500,000.00 for a total initial construction cost of $1,800,000.00. Thus, the initial construction cost per ton of refuse was $0.016.

A refuse disposal system was developed for the post-Haden scenario. Forty-five (45) fills were designed within 100 feet of intermittent streams in every hollow, on all of the lands owned by the company. It will require one bridge and 30.2 miles of road construction and unnecessary environmental damage to every watershed on the company's property. It costs approximately $500,000 to build diversion ditches and sediment ponds per refuse facility area. The bridge to transport refuse over the railroad tracks to some of these disposal areas will cost approximately $2,000,000. Road construction, at the site, to date has cost approximately $800,000/mile. Thus, initial construction costs are as follows:

Site Preparation:	45	@	$500,000/site	= $22,500,000
Bridge Construction:				= $ 2,000,000
Road Construction:	30.2 miles	@	$800,000/mile	= $24,160,000
Approximate Total				= $48,660,000

Furthermore, these facilities can only store approximately 43,000,000 tons of refuse. Therefore, just the initial construction cost per ton of refuse of $1.13 will make coal mining and processing unfeasible. Stability analysis of these fills, show that because they are placed on such steep terrain, they are not stable. Their factor of safety against static failure is 1.34, whereas, it is 1.08 against dynamic failure. The factors of safety required by MSHA and WVDEP are 1.5 and 1.2 respectively. Since these factors of safety are inadequate and unsafe per criteria required by state and federal governments, they cannot be built. Thus, it makes the mine complex unfeasible, since refuse cannot be disposed of due to the Haden decision.

Attachment C

Mine Tables

MINE: "A"	**Scenario 1**	**Scenario 2**
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	455,738,815	12,362,512
2. Bulking factor (Swell-Shrinkage) (%) BF	25%	25%
3. Total spoil material TSM (OB+IB) Times (BF)	569,673,815	15,453,140
4. Initial spoil in backfill (BKF) (cu.yds)	467,476,644	12,362,512
5. Initial excess spoil (TSM-BKF) (cu.yds)	102,196,875	3,090,628
6. Final volume of excess spoil yds (cu.yds.)	31,363,469	3,090,628
7. Final volume of backfill (cu.yds.)	538,310,049	12,362,512
8. Clean, recoverable (tons)	24,675,018	4,791,500
a. Number of seams mined	10	10
9. Number of fills	2	0
10. Volume of excess spoil in each fill (cu.yds.)	27,794,097	0
Fill 1	8,392,291	0
Fill 2	19,401,806	0
11. Acreage of footprint of each fill (acres)		
Fill 1	114	0
Fill 2	193	0
12. Contributing drainage each fill (acres)		
Fill 1	809.8	0
Fill 2	1018.7	0
13. Spoil Imbalance (cu.yds.)	3,569,382 excess	Not Applicable
14. Fills not feasible (List as applicable)	REASON	
Fill 1	Ephemeral point is above the crop of coal. No fill possible.	

MINE: "A"	**Scenario 1**		**Scenario 2**	
Fill 2	Ephemeral point is above the crop of coal. No fill possible.			
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	51.1%	98.9%	0%	0%
Contour (Including multiple cuts, point removal)	43.3%	Incl. In mtn-top	21.6%	29.7%
Highwall miner/auger	5.6%	1.2%	27.5%	20.4%
Underground	0%	0%	50.9%	49.9%

MINE: “F”	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden)(OB + IB)	67,159,576	15,933,045
2. Bulking factor (Swell-Shrinkage) (%) BF	30	30
3. Total spoil material TSM (OB+IB) Times (BF)	87,307,449	20,112,960
4. Initial spoil in backfill (BKF) (cu.yds)	49,531,066	12,782,356
5. Initial excess spoil (TSM-BKF) (cu.yds)	37,776,383	7,930,602
6. Final volume of excess spoil yds (cu.yds.)	24,655,893	5,672,938
7. Final volume of backfill (cu.yds.)	62,651,556	15,040,022
8. Clean, recoverable (tons)	7,063,006	1,392,516
a. Number of seams mined	6	5
9. Number of fills	7	2
10. Volume of excess spoil in each fill (cu.yds.)	24,655,893	3,115,073
Fill 1	2,238,028	0
Fill 1A	576,650	0
Fill 2	3,255,838	0
Fill 2A	331,260	0
Fill 3	3,312,378	0
Fill 4	12,844,929	1,018,263
Fill 5	2,096,810	2,096,810
11. Acreage of footprint of each fill (acres)		
Fill 1	23.45	
Fill 1A	7.58	
Fill 2	38.12	
Fill 2A	5.27	
Fill 3	25.73	
Fill 4	80.45	23.40
Fill 5	20.40	20.40
12. Contributing drainage each fill (acres)		
Fill 1	176.59	
Fill 1A	60.83	

MINE: "F"	**Scenario 1**	**Scenario 2**
Fill 2	209.73	
Fill 2A	70.90	
Fill 3	121.84	
Fill 4	228.00	76.25
Fill 5	119.10	119.10
13. Spoil Imbalance (cu.yds.)		Not Applicable
14. Fills not feasible (List as applicable)	REASON	
Fill # 1	Ephemeral stream ends above mine contour cut	
Fill #1A	Ephemeral stream ends 60' below Coalburg outcrop	
Fill #2	Ephemeral stream ends above mine contour cut	
Fill #2A	Ephemeral stream ends near Coalburg outcrop	
Fill #3	Ephemeral stream ends 60' above Coalburg outcrop	

MINE: "F"	**Scenario 1**		**Scenario 2**	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	15%	21%	12%	31%
Contour (Including multiple cuts, point removal)	85%	57%	88%	58%
Highwall miner/auger	0	22%	0	11%
Underground	0	0	0	0

MINE: "G"	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	51,600,000	51,600,00
2. Bulking factor (Swell-Shrinkage) (%) BF	25%	25%
3. Total spoil material TSM (OB+IB) Times (BF)	64,400,000	64,400,000
4. Initial spoil in backfill (BKF) (cu.yds)	25,500,000	25,500,00
5. Initial excess spoil (TSM-BKF) (cu.yds)	38,900,000	38,900,000
6. Final volume of excess spoil yds (cu.yds.)	38,900,000	33,700,000
7. Final volume of backfill (cu.yds.)	25,500,000	30,700,000
8. Clean, recoverable (tons)	3,100,000	--
a. Number of seams mined	8	--
9. Number of fills	2	1
10. Volume of excess spoil in each fill (cu.yds.)	39,100,000	15,300,000
Fill 1	4,500,000	–
Fill 2	34,600,000	15,300,000
11. Acreage of footprint of each fill (acres)		
Fill 1	32	--
Fill 2	125	53
12. Contributing drainage each fill (acres)		
Fill 1	86	---
Fill 2	285	
13. Spoil Imbalance (cu.yds.)	200,000 excess storage	18,400,000 deficit storage
14. Fills not feasible (List as applicable)	REASON	
Fill 1 & 2	No access to toe area due to WV turnpike Small fill volume (0.9mm) to face area and # of benches (10) Stability borderline at toe with +/- 20% slopes	

MINE: "G"	**Scenario 1**		**Scenario 2**	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	100%	100%	0	0
Contour (Including multiple cuts, point removal)				
Highwall miner/auger				
Underground				

MINE: "L"	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	6,374,857	N/A
2. Bulking factor (Swell-Shrinkage) (%) BF	120%	N/A
3. Total spoil material TSM (OB+IB) Times (BF)	7,649,828	N/A
4. Initial spoil in backfill (BKF) (cu.yds)	5,841,840	N/A
5. Initial excess spoil (TSM-BKF) (cu.yds)	1,807,988	N/A
6. Final volume of excess spoil yds (cu.yds.)	576,098	N/A
7. Final volume of backfill(cu.yds.)	7,073,730	N/A
8. Clean, recoverable (tons)	978,000	N/A
a. Number of seams mined		
9. Number of fills	5	N/A
10. Volume of excess spoil in each fill(cu.yds.)	2,366,501	0
Fill 1	171,407	N/A
Fill 2	551,848	N/A
Fill 3	757,700	N/A
Fill 4	757,700	N/A
Fill 5	127,846	N/A
11. Acreage of footprint of each fill (acres)		
Fill 1	2.55	N/A
Fill 2	6.89	N/A
Fill 3	9.38	N/A
Fill 4	4.01	N/A
Fill 5	2.55	N/A
12. Contributing drainage each fill (acres)		
Fill 1	32.07	
Fill 2	39.01	
Fill 3	55.87	
Fill 4	15.65	
Fill 5	32.07	
13. Spoil Imbalance (cu.yds.)		Not Applicable

MINE: “L”	Scenario 1	Scenario 2
14. Fills not feasible (List as applicable)	REASON	
Fill # 1	Ephemeral zone located at or above seam proposed to be mined	
Fill # 2	Ephemeral zone located at or above seam proposed to be mined	
Fill # 3	Ephemeral zone located at or above seam proposed to be mined	
Fill # 4	Ephemeral zone located at or above seam proposed to be mined	
Fill # 5	Ephemeral zone located at or above seam proposed to be mined	

MINE: “L”	Scenario 1		Scenario 2	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop				
Contour (Including multiple cuts, point removal)	100%	100%	0	0
Highwall miner/auger				
Underground				

MINE: "P"	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	23,971,230	N/A
2. Bulking factor (Swell-Shrinkage) (%) BF	125%	N/A
3. Total spoil material TSM (OB+IB) Times (BF)	29,964,038	N/A
4. Initial spoil in backfill (BKF) (cu.yds)	18,020,749	N/A
5. Initial excess spoil (TSM-BKF) (cu.yds)	11,943,289	N/A
6. Final volume of excess spoil yds (cu.yds)	10,606,601	N/A
7. Final volume of backfill (cu.yds)	19,357,437	N/A
8. Clean, recoverable (tons)	2,628,672	N/A
a. Number of seams mined	1	1
9. Number of fills	3	N/A
10. Volume of excess spoil in each fill (cu.yds.)	11,012,792	82,589
Fill 1	6,480,931	N/A
Fill 2	1,864,143	82,589
Fill 3	2,667,718	N/A
*Fill 4	0	0
11. Acreage of footprint of each fill (acres)		
Fill 1	40.92	
Fill 2	16.61	1.46 & 1.24
Fill 3	21.39	
12. Contributing drainage each fill (acres)		
Fill 1	46.32	
Fill 2	31.25	20.51 & 9.11
Fill 3	37.98	
Fill 4	0	0
13. Spoil Imbalance (cu.yds.)		Not Applicable
14. Fills not feasible (List as applicable)	REASON	
Fill 1	Ephemeral zone located at or above seam proposed to be mined	
Fill 2	Fill volumes to small to support any surface mining activities worthy of any financial investment	
Fill 3	Ephemeral zone located at or above seam proposed to be mined	

MINE: "P"	Scenario 1	Scenario 2
Fill 4	2 Gas wells + "E" Point C coal burns	
15. Tonnage w/ losses	2,629,000	31,500*

MINE: "P"	Scenario 1		Scenario 2	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop				
Contour (Including multiple cuts, point removal)	100%	100%	0%	
Highwall miner/auger				
Underground				

* Scenario 2 reserves should be considered "zero" as it is economically infeasible to construct the small valley fills for such small tonnage.

MINE: "Q"	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	133,694,419	112,282,436
2. Bulking factor (Swell-Shrinkage) (%) BF	25%	25%
3. Total spoil material TSM (OB+IB) Times (BF)	167,118,024	140,353,045
4. Initial spoil in backfill (BKF) (cu.yds)	71,768,341	64,698,907
5. Initial excess spoil (TSM-BKF) (cu.yds)	95,349,683	75,654,138
6. Final volume of excess spoil yds (cu.yds)	95,448,606	51,358,847
7. Final volume of backfill (cu.yds)	71,768,341	88,994,198
8. Clean, recoverable (tons)	9,269,323	8,380,016
a. Number of seams mined		
9. Number of fills	11	17
10. Volume of excess spoil in each fill (cu.yds)	72,235,241	56,503,152
Fill 1	360,840	363,840
Fill 1A	0	6,920,711
Fill 2	2,503,164	3,145,338
Fill 3	3,202,391	3,767,438
Fill 4	1,611,428	1,810,210
Fill 5	2,664,755	2,167,610
Fill 6	12,308,235	0
Fill 7	33,461,735	0
Fill 7A	0	9,245,603
Fill 7C	0	312,268
Fill 7D	0	1,789,743
Fill 7E	0	1,099,779
Fill 7F	0	870,468
Fill 7G	0	902,612
Fill 7H	0	2,767,839
Fill 8	4,119,157	4,542,669
Fill 9	2,415,196	3,879,469
Fill 10	6,140,609	9,472,824

MINE: "Q"	Scenario 1	Scenario 2
Fill 11	3,344,731	3,444,731
11. Acreage of footprint of each fill (acres)	245	239
Fill 1	6	6
Fill 1A	0	25
Fill 2	14	14
Fill 3	16	16
Fill 4	10	10
Fill 5	7	7
Fill 6	43	0
Fill 7	76	0
Fill 7A	0	34
Fill 7C	0	3
Fill 7D	0	12
Fill 7E	0	10
Fill 7F	0	9
Fill 7G	0	7
Fill 7H	0	14
Fill 8	18	18
Fill 9	15	15
Fill 10	24	23
Fill 11	16	16
12. Contributing drainage each fill (acres)	939	916
Fill 1	34	34
Fill1A	0	45
Fill 2	41	41
Fill 3	52	52
Fill 4	67	67
Fill 5	141	141
Fill 6	169	0
Fill 7	240	0

MINE: "Q"	**Scenario 1**	**Scenario 2**
Fill 7A	0	80
Fill 7C	0	17
Fill 7D	0	71
Fill 7E	0	56
Fill 7F	0	45
Fill 7G	0	32
Fill 7H	0	41
Fill 8	50	50
Fill 9	45	45
Fill 10	47	46
Fill 11	53	53
13. Spoil Imbalance (cu.yds)	0	Not Applicable
14. Fills not feasible (List as applicable)	REASON	
Fill 1		
Fill 2		
Fill 3		
Fill 4		

MINE: "Q"	**Scenario 1**		**Scenario 2**	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	yes	*	*	*
Contour (Including multiple cuts, point removal)	yes	*	*	*
Highwall miner/auger	yes	*	*	*
Underground	no	*	no	*

* Not reported

MINE: “R”	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	75,050,426	75,050,426
2. Bulking factor (Swell-Shrinkage) (%) BF	138%	138%
3. Total spoil material TSM (OB+IB) Times (BF)	103,569,588	103,569,588
4. Initial spoil in backfill (BKF) (cu.yds)	68,741,822	67,333,957
5. Initial excess spoil (TSM-BKF) (cu.yds)	34,827,766	36,235,631
6. Final volume of excess spoil yds (cu.yds)	---	5,576,589
7. Final volume of backfill (cu.yds)	---	68,313,689
8. Clean, recoverable (tons)	4,186,044	0
a. Number of seams mined	3	
9. Number of fills	5	7
10. Volume of excess spoil in each fill (cu.yds.)	35,115,484	6,363,702
Fill 1	3,164,172	1,651,046
Fill 2	20,210,841	A. 439,148 B. 2,171,732
Fill 3	2,930,953	1,303,475
Fill 4	6,484,611	11,188
Fill 5	2,324,907	782,887
Fill 6		3,226
11. Acreage of footprint of each fill (acres)		
Fill 1	24.19	7.52
Fill 2	86.26	A. 3.58 B. 20.16
Fill 3	24.57	3.94
Fill 4	36.74	0.80
Fill 5	17.06	4.23
Fill 6		0.47
12. Contributing drainage each fill (acres)		
Fill 1	189.48	101.15
Fill 2	176.68	A. 26.75
Fill 3	97.19	B. 33.77

MINE: "R"	Scenario 1	Scenario 2
Fill 4	78.18	56.17
Fill 5	89.08	11.98
Fill 6		49.88
Fill 7		14.85
13. Spoil Imbalance (cu.yds.)	N/A	29,538,895
14. Fills not feasible (List as applicable)	REASON	
Fill 4	Not economical to construct	
Fill 5	Not economical to construct	

MINE: "R"	Scenario 1		Scenario 2	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	97	97	-	-
Contour (Including multiple cuts, point removal)	3	3	-	-
Highwall miner/auger				
Underground				

MINE: “S”	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	32,256,300	18,706,800
2. Bulking factor (Swell-Shrinkage) (%) BF	30	30
3. Total spoil material TSM (OB+IB) Times (BF)	9,676,890	5,612,040
4. Initial spoil in backfill (BKF) (cu.yds)	30,513,370	16,578,848
5. Initial excess spoil (TSM-BKF) (cu.yds)	11,963,750	7,738,952
6. Final volume of excess spoil yds (cu.yds)	11,963,750	9,547,799
7. Final volume of backfill(cu.yds)	30,513,370	16,578,848
8. Clean, recoverable (tons)	2,480,560	1,944,000
a. Number of seams mined	4	4
9. Number of fills	10	8
10. Volume of excess spoil in each fill (cu.yds)	11,964,144	9,547,799
Fill 1	2,656,048	0
Fill 2	155,759	155,759
Fill 3	224,321	224,321
Fill 4	927,778	927,778
Fill 5	786,625	786,625
Fill 6	389,978	389,978
Fill 7	1,092,950	1,092,950
Fill 8	1,176,741	2,985,194
Fill 9	2,985,194	2,985,194
Fill 10	1,568,750	0
11. Acreage of footprint of each fill (acres)		
Fill 1	37	0
Fill 2	3.2	3.2
Fill 3	5.25	5.25
Fill 4	14.94	14.94
Fill 5	8.36	8.36
Fill 6	6.94	6.94
Fill 7	11.48	11.48

MINE: “S”	Scenario 1	Scenario 2
Fill 8	9.96	9.96
Fill 9	21.26	21.26
Fill 10	13.7	0
12. Contributing drainage each fill (acres)		
Fill 1	158.7	0
Fill 2	23.2	23.2
Fill 3	18.86	18.86
Fill 4	42.61	42.61
Fill 5	29.18	29.18
Fill 6	22.8	22.8
Fill 7	28.64	28.64
Fill 8	25	25
Fill 9	68.23	68.23
Fill 10	75.35	0
13. Spoil Imbalance (cu.yds.)	543,930	Not Applicable
14. Fills not feasible (List as applicable)	REASON	
Fill 1	Located in intermittent stream	
Fill 10	Located in intermittent stream	

MINE: "S"	**Scenario 1**		**Scenario 2**	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	80	74	90	84
Contour (Including multiple cuts, point removal)	20	20	10	7
Highwall miner/auger	0	6	0	9
Underground	0	0	0	0

MINE: "U"	**Scenario 1**	**Scenario 2**
1. Bank cu. yds. (Overburden plus Interburden) (OB + IB)	215,517,000	0
2. Bulking factor (Swell-Shrinkage) (%) BF	25%	
3. Total spoil material TSM (OB+IB) Times (BF)	287,356,000	
4. Initial spoil in backfill (BKF) (cu.yds)	188,429,000	
5. Initial excess spoil (TSM-BKF) (cu.yds)	98,927,000	
6. Final volume of excess spoil yds (cu.yds)	81,155,824	
7. Final volume of backfill (cu.yds)	206,026,000	
8. Clean, recoverable (tons)	17,629,000	
a. Number of seams mined	5 major horizons	
9. Number of fills	7	
10. Volume of excess spoil in each fill (cu.yds)	95,466,247	3,486,702
Fill 1	7,020,200	197,088
Fill 2	24,737,800	2,273,176
Fill 3	19,272,200	67,636
Fill 4	22,057,549	257,683
Fill 5	2,174,198	---
Fill 6	3,326,600	---
Fill 7	16,877,700	691,119
11. Acreage of footprint of each fill (acres)		
Fill 1	40.36	4.17
Fill 2	98.72	16.72
Fill 3	72.51	3.46
Fill 4	64.95	11.54
Fill 5	22.10	---
Fill 6	30.62	---
Fill 7	93.63	9.75
12. Contributing drainage each fill (acres)		
Fill 1	171.80	85.30
Fill 2	224.70	16.72

MINE: "U"	Scenario 1	Scenario 2
Fill 3	210.00	43.34
Fill 4	189.90	68.16
Fill 5	83.70	---
Fill 6	74.60	---
Fill 7	191.10	40.99
13. Spoil Imbalance (cu.yds)		Not Applicable
14. Fills not feasible (List as applicable)	REASON	
Fill 1	Too small	
Fill 2	Too small	
Fill 4	Too small	
Fill 5 & 6	Fill won't fit above intermittent stream	
Fill 7	Too small	

MINE: "U"	Scenario 1		Scenario 2	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	95%	95%	0	0
Contour (Including multiple cuts, point removal)	5%	3%		
Highwall miner/auger	0	2%		
Underground	0	0		

MINE: "V"	Scenario 1	Scenario 2
1. Bank cu. yds. (Overburden plus Interburden)(OB + IB)	NA	NA
2. Bulking factor (Swell-Shrinkage) (%) BF	NA	NA
3. Total spoil material TSM (OB+IB) Times (BF)	NA	NA
4. Initial spoil in backfill (BKF) (cu.yds)	NA	NA
5. Initial excess spoil (TSM-BKF) (cu.yds)	NA	NA

MINE: “V”	Scenario 1	Scenario 2
6. Final volume of excess spoil yds (cu.yds.)	NA	NA
7. Final volume of backfill(cu.yds.)	NA	NA
8. Clean, recoverable (tons)	110,000,000	0
a. Number of seams mined		
9. Number of fills	1	45
10. Volume of excess spoil in each fill(cu.yds.)		
Fill 1	81,480,000	
Fill 1-45		31,850.000
11. Acreage of footprint of each fill (acres)		
Fill 1		
Fill 1-45		
12. Contributing drainage each fill (acres)		
Fill 1		
Fill 1-45		
13. Spoil Imbalance (cu.yds.)		Not Applicable
14. Fills not feasible (List as applicable)	REASON	
Fill #1-45	All smaller fills were unstable (Toes on steep slopes) Cost prohibitive-Requires bridge, 30.2 miles of additional haul roads	

MINE: "V"	**Scenario 1**		**Scenario 2**	
Mine Characteristics	% Acre	% Ton	% Acre	% Ton
Mountaintop	NA	NA	NA	NA
Contour (Including multiple cuts, point removal)	NA	NA	NA	NA
Highwall miner/auger	NA	NA	NA	NA
Underground	90	90	0	0
Refuse Disposal	100	100	0	0

Attachment D

US Geological Survey Report

Prepared by:
U.S. Geological Survey *304-347-5* 130x225
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Introduction: The mountaintop mining engineering team will be receiving and reviewing alternative mine plans for a series of sites, assuming that excess spoil can be placed only in ephemeral stream reaches. The team needs to know the boundary between ephemeral and intermittent flow in each drainage at 3-7 mine sites. The legal definitions of stream categories suggest the boundary is the highest point in a stream channel that contains water on a dry day during the wet season. Anyone who can walk along a stream channel could find the place.

Problem: In humid climates like West Virginia, ephemeral streams, in general, drain the highest and smallest headwater basins, intermittent streams generally drain the slightly larger basins next downstream, and perennial streams drain still larger basins.

Stream categories are defined in the federal SMCRA regulations (30 C.F.R § *701.5):*

Ephemeral stream means a stream which flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice, and which has a channel bottom that is always above the local water table.
Intermittent stream means (a) a stream or reach of a stream that drains a watershed of at least one square mile, or (b) a stream or reach of a stream that is below the local water table for at least some part of the year, and obtains its flow from both surface runoff and ground water discharge.
Perennial stream means a stream or part of a stream that flows continuously during all of the calendar year as a result of ground-water discharge or surface runoff

These definitions, which draw on many decades of hydrological experience, differ first by describing when flow is present. Field determinations on this basis generally require observations at many sites over an extended time, which would be expensive. The definitions also describe interactions between surface and ground water, which could be more useful for field identification of the point at which an ephemeral stream becomes intermittent or perennial.

An intermittent stream obtains its flow from both surface runoff and ground water discharge, and therefore the channel is below the local water table for at least some part of the year. The channel elevation does not change, of course. This definition recognizes that the local water table rises and falls during the year. When the water table adjacent to the stream is above the stream channel, the intermittent stream will have continuous base flow. In contrast, the channel of an ephemeral stream is above the local water table even during the season when the water table is at maximum elevation; the ephemeral stream does not have any base flow.

The problem of identifying the boundary between ephemeral and intermittent flow thus becomes one of identifying the intersection of the channel bottom with the local water table, when the water table is at its maximum. Similarly, the boundary between intermittent and perennial flow is at the intersection of the channel bottom with the local water table, when the water table is at its minimum.

In southern West Virginia, ground-water recharge rates generally are greatest between December and April, when trees and other vegetation are dormant. Water table elevation is greatest during March and April. Recharge rates decrease and the water table begins to decline when the forest begins to leaf out in late April and May. Water levels in wells in the study area commonly begin to decline in April, but the change is small compared to May and June. Minimum water levels in wells occur between June and November, but temporary increases can occur any time during that period.

Approach to be Followed by the Ephemeral Field Team

An ephemeral stream goes dry when there has been no recent rain or snow melt, even during the wettest time of the year. An intermittent or perennial stream continues flowing on dry days because ground water sustains it. The boundary between ephemeral and intermittent flow is the place where the ground water table meets the bed of the stream. The ephemeral part of the stream is uphill from this boundary, and the intermittent part is downhill. We are interested only in streams that have not been changed by mining uphill from the boundary.

To find the boundary, choose a dry day in February, March, or April when the ground is not frozen. Searching downhill along a stream channel is best. Look for the highest point where water is pooled or ground water is entering the stream channel. Expect the ground to be moist, soft, or muddy near the boundary. If water is standing or flowing on the land surface, even over bare rock, you are downhill from the ephemeral part. You may find part of the stream with no visible flow at the surface, even though both higher and lower parts of the stream are flowing. The ephemeral part is above the highest part that is flowing.

Choose the lowest point that is clearly dry along the channel. Dig a hole in the streambed, about a foot deep. If water stands in the hole within a few minutes, you are at the boundary. If the hole remains dry, move downhill and try again, but stay above any standing or flowing water.

The most important observation is that water is flowing in a channel on the land surface. Any observation of shallow ground water in a nearby hole supports th surface observation , but is of secondary importance.

This process will be repeated in each valley within the permit area on the five selected sites. The ephemeral stream limit will be located using GPS units and the location transferred to maps developed for each site. In addition, the team will locate the point in each valley at which the stream slope becomes 10 % or less. (The Norris Method). This point will also be transferred to the map for the site.

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West Virginia Division of Environmental Protection

Cecil H. Underwood
Governor

Michael C. Castle
Director

MEMORANDUM

TO: Rocky Parsons
Joe Parker
Permit Supervisors
Permit Review Team
Inspection and Enforcement Supervisors
Inspectors

FROM: John C. Ailes

DATE: October 26, 1999

RE: Guidance for Delineation of Ephemeral/Intermittent Streams

A Guidance document for the delineation of Ephemeral/Intermittent Streams has been developed to conform with the Memorandum of Opinion and Order dated October 20, 1999 pertaining to buffer zones and water quality standards for intermittent streams and is effective immediately.

As stated in the procedure, it applies to structures for both pending applications and issued permits in order to delineate ephemeral/intermittent streams. Please ensure that all applicants and permittees receive a copy of this guidance document.

Please note that the field evaluation is conducted jointly by applicant and agency. If you have any questions pertaining to the guidance document, contact Lewis Halstead, Charlie Sturey or Ken Politan.

JCA:sl

Division of Environmental Protection
OFFICE OF MINING AND RECLAMATION

SERIES:	PERMIT APPLICATION PROCEDURE
SUBJECT:	**Guidance for Delineation of Ephemeral/Intermittent Streams For Purposes of the Memorandum Opinion and Order of October 20, 1999**
DATE:	**October 26, 1999**

Introduction

This guidance is being developed to conform with the Memorandum Opinion and Order of October 20, 1999 pertaining to buffer zones and water quality standards for intermittent/perennial streams.

Definitions

The Federal SMCRA definition of **ephemeral stream** which means "a stream which flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice, and which has a channel bottom that is always above the local water table" and **wet weather streams** defined in 46CSR1-2.22 "as streams that flow only in direct response to precipitation or whose channels are at all times above the water table" are synonymous.

Intermittent streams are defined in part, in 38CSR2-2.69, as "a stream or reach of a stream that is below the local water table for at least some part of the year, and obtains its flow from both surface runoff and groundwater discharge".

Intermittent streams are defined in 46CSR1-2.9 as those streams which have no flow during sustained periods of no precipitation and which do not support life whose life history requires residence in flowing waters for a continuous period of at least six (6) months.

Ordinary high water mark as defined in 33 CFR 329.11 is the line on the stream bank established by the fluctuation of water levels and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in soil characteristics, destruction or limits of terrestrial vegetation, and the presence of litter and debris.

Rationale

If a buffer zone waiver was requested in the application, the presumption is that the proposed fills, refuse facilities, sediment control facilities and ponds ("structures") are in intermittent or perennial streams, unless clearly documented in the application.

The procedure below applies to structures for both pending applications and issued permits. It will be utilized to determine the local water table in order to delineate the point between of the Director, that each structure is not located in an intermittent / perennial streams.

Procedure

Step 1. The applicant may utilize information contained in the application to demonstrate that the structure is not in the intermittent stream. If the data in the application shows stream flow (**not direct response to precipitation)** within the footprint of the structure, then it is in intermittent reaches of the stream. However, if the data in the application contains no documentation that the stream channel within the footprint of the structure is ephemeral, the applicant must proceed to Step 2.

Step 2. Field Evaluation (conducted jointly by applicant and agency).

Delineate the upper most extent of the ordinary high water for each stream channel within the footprint. Locate this point on a map and provide sufficient supporting documentation.

Begin walking downstream, until pooled or flowing water is observed in channel within the footprint. Locate this point on a map and provide sufficient supporting documentation.

Dig a hole, preferably 12 inches or deeper, in the streambed outside the area of the pool to see if water is entering the hole, this should be apparent within a few minutes. If not, repeat process down stream until local water table is established or outside the buffer zone area. If no consensus can be reached between applicant and agency proceed to Step 3.

Step 3. A biological survey using the "single habitat EPA Rapid Bioassessment Protocol " must be conducted for the footprint of the structure. If the footprint of the structure is void of indications of aquatic life then the area is deemed to be an ephemeral reach of the stream. However, if there is evidence of aquatic life present in the stream that requires less than six months of water flow to complete its life cycle, then the section of stream is deemed to be intermittent.